



# Safe, Stable, and Nurtured: Protective Factors against Poor Physical and Mental Health Outcomes Following Exposure to Adverse Childhood Experiences (ACEs)

Elizabeth Crouch<sup>1</sup> · Elizabeth Radcliff<sup>1</sup> · Melissa Strompolis<sup>2</sup> · Aditi Srivastav<sup>2</sup>

Published online: 25 May 2018

© Springer International Publishing AG, part of Springer Nature 2018

## Abstract

Protective factors can build resilience and potentially moderate the long-term impact of adverse childhood experiences (ACEs). To better understand the role of protective factors, this study examines the relationship of two protective factors focused on safe, stable and nurturing relationships, ACEs, and self-reported mental and physical health outcomes among a representative adult sample from the South Carolina Behavioral Risk Factor Surveillance System. Protective factors were assessed as potential moderators of ACEs and poor self-reported physical and mental health in multivariate logistic regression analyses. Respondents exposed to four or more ACEs who grew up with an adult who made them feel safe and protected were less likely to report frequent mental distress or poor health. The use of protective factors may be an effective prevention strategy for ACEs and its associated outcomes and may serve as a mechanism to “break the cycle” of childhood trauma.

**Keywords** Adverse childhood experiences · Resilience · Protective factors · Physical abuse · Sexual abuse · Health

## Introduction

Adverse childhood experiences (ACEs), categories of negative experiences in childhood encompassing neglect, abuse, and household dysfunction, are linked to poor behavioral, mental, and physical health later in life (Anda et al. 2006; Crouch et al. 2017; Felitti et al. 1998). For example, ACEs are associated with chronic disease, cancer, depression, and premature death (Brown et al. 2009, 2010; Chapman et al. 2004, 2013; Dube et al. 2003; Gilbert et al. 2015;). ACEs are also often co-occurring (Anda et al. 2006; Dong et al. 2004; Green et al. 2010; Morse et al. 2017; Rich-Edwards et al. 2012; Roy et al. 2010; Waite et al. 2013), with higher counts of ACEs increasing the likelihood of later poor health outcomes (Crouch et al. 2017; Felitti et al. 1998; Green et al. 2010). The pathway to negative long-term health effects is

through unmitigated exposure to the toxic stress associated with ACEs; ACEs may activate toxic stress hormones in the brain, disturbing healthy brain development in children and negatively impacting lifelong health (Shonkoff et al. 2009; Shonkoff and Garner 2012).

Not every child who experiences one or more ACEs, however, has poor long-term health outcomes (Bethell et al. 2016; Moore and Ramirez 2016). Children may cope successfully with these traumatic experiences and change their life trajectories from one of potentially poor health and well-being to one with more positive outcomes (Durlak 1998; Fergus and Zimmerman 2005; Walker et al. 2011). This process of overcoming adversity is called resilience (Fergus and Zimmerman 2005; Zimmerman 2014). Resiliency theory focuses on the action of promotive factors, or positive situational, social, or individual characteristics that have the potential to interrupt a negative life course (Fergus and Zimmerman 2005). These promotive factors may be assets (e.g., positive internal, individual characteristics) or resources (e.g., positive outside factors, situations, or relationships; Zimmerman 2014).

One framework guided by resiliency theory is the *protective factors model*. This framework suggests that the presence of assets and resources can promote resilience and modify the relationship between risks, such as ACEs, and negative outcomes (Zimmerman 2014). There are several versions of

---

✉ Elizabeth Crouch  
crouchel@mailbox.sc.edu

<sup>1</sup> South Carolina Rural Health Research Center, Arnold School of Health, University of South Carolina, 220 Stoneridge Drive, Suite 204, Columbia, SC 29210, USA

<sup>2</sup> Children’s Trust of South Carolina, Columbia, SC, USA

the protective factors model that detail ways in which resilience can be built through protective factors. Three broad categories have been established that include the presence of positive relationships; safe, protective, and equitable environments; and healthy development of social and emotional competencies (Center for the Study of Social Policy 2017; Child Information Gateway 2014; Greenberg 2006; Harper Browne 2014; Schofield et al. 2013; Thornberry et al. 2013).

Research has found that certain protective factors moderate the long-term risks of ACEs (McElroy and Hevey 2014; Moore and Ramirez 2016; Walker et al. 2011). The effects of ACEs may be partially or fully moderated by the presence of an adult who makes a child feel safe (Walker et al. 2011), by having adequate social support in the form of a loving, stable adult (McElroy and Hevey 2014), or by living in a safe, supportive neighborhood (Moore and Ramirez 2016). Because protective factors have been shown to moderate the stress of adverse experiences and have been linked to positive lifelong results (Greene 2008), the presence of protective factors may be particularly important among those with co-occurring ACEs.

ACEs have been acknowledged as a public health crisis given their association with diseases and illnesses that are linked to early mortality and contribute to rising healthcare costs (Srivastav et al. 2017). Approximately 35 million children nationally have experienced one or more types of childhood trauma and well over half of South Carolina's adults (62%) report experiencing ACEs (Morse et al. 2016; National Survey of Children's Health: NSCH 2011/12, n.d.). Yet, limited research has examined the effects of protective factors in mitigating long-term health and well-being outcomes, particularly on a population level (Larkin et al. 2014). Further research is needed to understand the relationships between ACEs, protective factors, and health outcomes on a population level in order to target prevention and intervention efforts (Metzler et al. 2017). Additionally, population level research on protective factors could serve as a foundation for public health programs, policies, and innovations by potentially reinforcing the need to address the role of social and environmental contexts in strategies to promote healthy behaviors and outcomes.

This study focuses on the protective factor of the presence of positive adult relationships in a child's life, drawing on substantial research that has been conducted on the role of safe, stable, and nurturing relationships (SSNRs). While SSNRs have been studied mostly within the context of child maltreatment, or experiences that generally encompass different types of abuse and neglect, it can be argued that the premise of SSNRs parallels the importance of positive relationships as protective factors given that abuse and neglect are types of ACEs (Schofield et al. 2013). Additionally, SSNRs have been linked to other types of protective factors, such as

their ability to promote the development of healthy social and emotional competencies and their role in creating a safe, protective, and equitable environment (Merrick et al. 2013; Thornberry et al. 2013). It should be noted that the Centers for Disease Control and Prevention (CDC) promotes SSNRs as a primary prevention mechanism for child maltreatment, and suggests that the presence of SSNRs can moderate the effects of maltreatment and ACEs that may have already occurred (Schofield et al. 2013; US Centers for Disease Control and Prevention 2014b). Thus, we believe that evidence behind SSNRs can support research on ACEs.

This study used a state dataset that included both conventional and supplemental ACE questions to examine the relationship between ACEs, protective factors that addressed the presence of SSNRs, and self-reported mental and physical health outcomes among a representative sample of South Carolina adults. Based on previous research, we expected to find that individuals reporting four or more ACEs experienced less exposure to protective factors than those reporting fewer than four ACEs. Examining only individuals reporting four or more ACEs, we expected to find poorer physical and mental health outcomes for those who experienced less exposure to protective factors.

## Methods

### Data Source

Data came from the 2016 South Carolina Behavioral Risk Factor Surveillance System (SC BRFSS). The SC BRFSS is designed by the CDC, managed by the South Carolina Department of Health and Environmental Control (SC DHEC), and administered by the University of South Carolina's Institute of Public Service and Policy Research (US Centers for Disease Control and Prevention 2014a). The survey uses both cell phones and landlines to collect data from non-institutionalized adults who are 18 years or older. In 2016, 7079 respondents answered the ACE module and had complete demographic information. To adjust for sampling techniques and non-response, population weights assigned by the CDC were used (Morse et al. 2016).

### Exposure Variables

The ACE survey module has been included in the SC BRFSS since 2014, resulting from a partnership between Children's Trust of South Carolina and SC DHEC (Morse et al. 2016). The eleven original ACE questions can be found in Table 1. We created our ACE exposure variable by collapsing the number of different types of ACEs an individual reported to a binary "less than four ACEs" or "four or more ACEs". Examining ACEs by exposure to four or more has been used

**Table 1** ACE survey and supplemental questions included in the 2016 SC BRFSS

Adverse childhood experiences	Survey questions
Household mental illness	1. Did you live with anyone who was depressed, mentally ill, or suicidal?
Household substance use	2. Did you live with anyone who was a problem drinker or alcoholic?
	3. Did you live with anyone who used illegal street drugs or who abused medications?
Household incarceration	4. Did you live with anyone who served time or was sentenced to serve time in a prison, jail, or other correctional facility?
Parental separation/divorce	5. Were your parents separated or divorced?
Witnessing household violence	6. Did your parents or adults in your home ever slap, hit, kick, punch, or beat each other up?
Physical or emotional abuse	7. Before age 18, did a parent or adult in your home ever hit, beat, kick, or physically hurt you in any way?
	8. Did a parent or adult in your home ever swear at you, insult you, or put you down?
Sexual abuse	9. Did anyone at least 5 years older than you or an adult ever touch you sexually?
	10. Did anyone at least 5 years older than you or an adult try to make you touch them sexually?
	11. Did anyone at least 5 years older than you or an adult force you to have sex?
Supplemental survey questions	
Protective factors	S-1. For how much of your childhood was there an adult who made you feel safe and protected?
	S-2. For how much of your childhood was there an adult who tried hard to make sure your basic needs were met?

ACE, adverse childhood experience; SC, South Carolina; BRFSS, Behavioral Risk Factor Surveillance System

in previous research (Dube et al. 2006; Felitti et al. 1998), but does not take into consideration frequency, length, or exposure to any one ACE.

In 2016, the ACE module included two additional questions that addressed protective factors as they relate to SSNRs (Table 1). The protective supplemental questions include “for how much of your childhood was there an adult who made you feel safe and protected?” and “for how much of your childhood was there an adult who tried hard to make sure your basic needs were met?” Responses for these questions included little to never of the time, some to most of the time, and all of the time.

## Outcome Variables

The dependent variables examined were self-reported health and mental distress. These measures have been utilized in previous research (Crouch et al. 2017). Self-reported health was asked as “would you say that in general your health is excellent, very good, fair, or poor?”, with health classified as good when responses were good, very good, or excellent and poor when responses were poor or fair. Mental distress was determined using the question “now thinking about your mental health, which includes stress, depression, and problems with emotions, for how many days during the past 30 days was your mental health not good?” 14 days was used as the cut-off point, as 14 days is a frequently used marker for depression and anxiety diagnoses (Bonnie and Monahan 1997; US Centers for Disease Control and Prevention 1998).

Fourteen or more days with mental health self-reported as “not good” was classified as frequent mental distress, with less than 14 days classified as low to moderate mental distress.

## Control Variables

Control variables included sex, age, race/ethnicity, educational attainment, and income. Age was divided into the following groups: 18 to 29, 30 to 39, 40 to 49, 50 to 59, 60 to 69, and 70 to 80. Race was categorized as: Non-Hispanic White, Non-Hispanic African-American, Hispanic, and “Other” Non-Hispanic. Education was divided by those with less than or equal to high school degree/GED and those with at least some college. Income categories included those making less than \$25,000, \$25,000 to \$49,999, and \$50,000 or more. Those with missing information for income were included to maintain our sample size; 12.7% of our sample chose not to disclose their income.

Descriptive and bivariate analyses were conducted using chi-square tests with  $\alpha = 0.05$ . Separate multivariate regression models were used to examine the impact of exposure to four or more ACEs and the interaction of exposure to four or more ACEs and level of each protective factor on overall health and mental distress. All analyses used sampling weights and were conducted with statistical software (SAS, version 9.3; SAS Institute Inc.). Finally, this study was approved by the [name concealed for review] institutional review board as exempt.

## Results

Over half of the total sample was female (51.9%), non-Hispanic White (59.9%), and had at least some college (59.9%, Table 2). Just over 10 % of the sample were between the ages of 70 and 80 (10.7%) and the rest of the sample was distributed roughly the same amount over each age group. Forty percent of the respondents had a high school education or less. Less than half of the sample made \$50,000 or more a year (41.0%) and nearly a quarter (23.1%) made less than \$25,000 a year. The majority of respondents reported that they grew up with an adult who made them feel safe and protected (96.6%) and an adult who made sure their basic needs were met (98.4%). Less than 20 % (18.1%) of the total sample reported having four or more ACEs. Examining the outcome measures, 17.0% of all respondents reported poor general health and 12.9% of respondents reported frequent mental distress in the past month.

Respondents who had experienced four or more ACEs were more likely to report poor health than their counterparts with less than four ACEs (25.2% versus 15.2%,  $p < 0.001$ , Table 2). Respondents with four or more ACEs were also more likely to report frequent mental distress (26.2%) than those with less than four ACEs (9.9%,  $p < 0.001$ ). Compared to respondents with less than four ACEs, respondents with four or more ACEs were less likely to report protective factors of growing up with an adult who made them feel safe and protected all of the time (39.2% versus 88.3%,  $p < 0.001$ ) and less likely to report growing up with an adult who made sure their basic needs were met all of the time (65.0% versus 92.5%,  $p < 0.001$ ).

In unadjusted analysis, respondents who had an adult who made them feel safe all of the time were more likely to report good health than poor health (81.3% versus 70.0%,  $p < 0.001$ , Table 3) and more likely to report low to moderate mental distress versus frequent mental distress (81.1% versus 67.2%,  $p < 0.0001$ ). These same patterns held true for respondents who had an adult who made sure their basic needs were met all of the time, with those respondents also more likely to report good overall health versus poor overall health (89.3% versus 79.1%,  $p < 0.0001$ , Table 3) and more likely to report low to moderate mental distress versus frequent mental distress (88.8% versus 78.7%;  $p < 0.0001$ ).

Multivariable analyses were used to examine the relationships between exposure to four or more ACEs and subsequent exposure to four or more ACEs by level of each protective factor and poor overall health, adjusting for sex, age, educational attainment, race/ethnicity, and income. The odds of reporting poor overall health were higher among respondents exposed to four or more ACEs (aOR 2.08; 95% CI 2.06–2.09; Table 4). The odds of poor health for those exposed to four or more ACEs was lower if the respondents grew up with an adult who made them feel safe and protected some to most

of the time (aOR 0.61; 95% CI 0.60–0.62), and for respondents who felt safe and protected all of the time (aOR 0.60; 95% CI 0.59–0.62) compared to those grew up with an adult who made them feel safe and protected little of the time to never. Respondents exposed to four or more ACEs and who grew up with an adult who made sure basic needs were met some to most of the time were also less likely to report poor health (aOR 0.84; 95% CI 0.82–0.87) compared to those who grew up with an adult who made sure their basic needs were met little of the time to never.

In multivariable analyses adjusting for sex, age, race/ethnicity, educational attainment, and income, the odds of reporting frequent mental distress were higher among respondents exposed to four or more ACEs (aOR 3.05; 95% CI 3.02–3.07; Table 4). Respondents exposed to four or more ACEs who grew up with an adult who made them feel safe and protected some to most of the time were less likely to report frequent mental distress (aOR 0.69; 95% CI 0.67–0.70), compared to those who grew up with an adult who made them feel safe and protected little of the time to never. Respondents exposed to four or more ACEs who grew up with an adult who made sure basic needs were met were some to most of the time were also less likely to report frequent mental distress as an adult (aOR 0.84; 95% CI 0.82–0.87), compared to those who grew up with an adult who made sure their basic needs were met little to some of the time.

## Discussion

This study investigated whether the presence of protective factors associated with SSNRs in childhood moderated the relationship between ACEs and poor health outcomes in adulthood using SC BRFSS data. As expected, we found that fewer individuals with four or more ACEs reported “having an adult during their childhood who made them feel safe and protected” some to most or all the time compared to those with less than four ACEs. We also found fewer respondents with four or more ACEs who had an adult who “made sure their basic needs were met” some to most or all the time compared to those with less than four ACEs. The moderating effects of SSNRs were present in our findings: exposure to four or more ACEs and long-term poor health or frequent mental distress were moderated by having an adult who some to most or all of the time made the respondent feel safe and protected during childhood, or made sure their basic needs were met some to most or all of the time during childhood. Surprisingly, we did not find a dose-response relationship between the level of protective factor and the association with poor health or frequent mental distress. We hypothesize that distinguishing between most of the time and all of the time may not vary greatly among adults, thus minimizing this relationship.

**Table 2** Characteristics of respondents to the 2016 SC BRFSS survey, in total and stratified by ACE exposure ( $n = 7079$ )

Characteristic	All (%)	ACE Exposure	
		% with <4 ACES	% with $\geq 4$ ACES*
General Health			
Good	83.0	84.8	74.8
Poor	17.0	15.2	25.2
Frequent mental distress in past month			
Low/Moderate	87.1	90.1	73.8
High	12.9	9.9	26.2
Types of protective factors			
Adult who made you feel safe and protected			
Little to never of the time	3.9	1.7	13.3
Some to most of the time	16.9	10.0	47.5
All of the time	79.2	88.3	39.2
Adult who made sure basic needs were met			
Little to never of the time	1.8	1.2	4.2
Some to most of the time	10.8	6.3	30.8
All of the time	87.4	92.5	65.0
Sex			
Male	48.1	50.2	38.3
Female	51.9	49.8	61.7
Age (in years)			
18–29	19.7	19.3	21.8
30–39	17.4	16.4	21.9
40–49	15.7	14.8	19.9
50–59	18.3	17.9	20.1
60–69	18.1	19.6	11.7
70–80	10.7	12.1	4.6
Race/Ethnicity			
White, non-Hispanic	69.8	69.6	70.5
Black, Non-Hispanic	22.8	23.2	20.9
Hispanic	4.5	4.3	5.3
"Other" Non-Hispanic	2.9	2.9	3.3
Education			
High school graduate or less	40.0	39.6	42.1
At least some college	59.9	60.4	57.9
Income, per year			
< \$25,000	23.1	21.8	28.9
\$25,000–\$49,999	23.3	22.7	26.3
$\geq$ \$50,000	41.0	42.2	35.6
Missing	12.7	13.4	9.3

\*All differences comparing those with less than four to those with more than four ACES are significant at  $p < 0.001$ . ACE, adverse childhood experience; SC, South Carolina; BRFSS, Behavioral Risk Factor Surveillance System

These findings suggest that the presence of protective factors may have a role in moderating the number of ACEs a child may experience or the long-term impact of those ACEs. Because a dose-response relationship is often associated with number of ACEs and poor outcomes (Edwards et al. 2003; Felitti et al. 1998), simply reducing the number of ACEs a child experiences

can be important to their long-term health and well-being. Additionally, among adults most at risk for the long-term consequences of ACEs (i.e., those reporting four or more ACEs), the presence during childhood of an adult who made them feel safe and protected appears to be a stronger influence on later physical and mental health than having someone who met basic needs.



**Table 3** Types of protective factors stratified by self-reported health and frequency of mental distress among respondents to the 2016 SC BRFSS survey

	Good Weighted Percentage (Unadjusted) <sup>1</sup>	Poor Weighted Percentage (Unadjusted) <sup>1</sup>	Low to Moderate Weighted Percentage (Unadjusted) <sup>1</sup>	Frequent Weighted Percentage (Unadjusted) <sup>1</sup>
Had an adult who made you feel safe and protected <i>little to never of the time</i>	2.8	8.5	3.2	8.3
Had an adult who made you feel safe and protected <i>some to most of the time</i>	15.9	21.5	15.7	24.6
Had an adult who made you feel safe and protected <i>all of the time</i>	81.3	70.0	81.1	67.2
Had an adult who made sure basic needs were <i>little to never of the time</i>	1.1	4.7	1.5	3.6
Had an adult who made sure basic needs were met <i>some to most of the time</i>	9.6	16.2	9.8	17.7
Had an adult who made sure basic needs were met <i>all of the time</i>	89.3	79.1	88.8	78.7

<sup>1</sup> Differences by health status in characteristics of the respondents, all values  $p < 0.0001$ . SC, South Carolina; BRFSS, Behavioral Risk Factor Surveillance System

This study provides innovative evidence of the importance of protective factors to moderate the relationship between ACEs and negative health outcomes on a population level, especially the significance of having an adult present who makes the child feel, safe, stable, and nurtured. The implications of this study are timely and relevant as factors that may prevent ACE exposure from occurring or help build resilience to overcome ACE exposure have become increasingly important to statewide programs and policies that look to address adult health outcomes associated with adverse events in childhood.

### Strengths and Limitations

This study is the first to examine protective factors and their association with ACEs using representative state level data. South Carolina's BRFSS data is weighted to adequately

represent the population of the state and the ACE survey model has been tested, validated, and is used extensively for research (Anda et al. 2006; Chung et al. 2010; Crouch et al. 2017; Dong et al. 2004; Dube et al. 2002; Felitti et al. 1998; Ford et al. 2011; Larkin et al. 2012). We are, however, limited to examining the ACEs and protective factors included in the SC BRFSS and recognize that both adversities and protective factors beyond those examined may exist. There are limitations in the characteristics of this sample, as the sample was marked by a high level of SSNRs and adult who made sure their basic needs were met. Further, there was a low percentage of individuals who experienced four or more ACEs growing up, and generally speaking, the proportion of psychologically healthier individuals was notable.

As with any studies that use BRFSS data, we acknowledge that the data is cross-sectional and self-reported. Thus, the data may be influenced by the time between the event and the time

**Table 4** Adjusted odds ratios<sup>1</sup> and 95% Wald confidence intervals predicting poor health and experience of frequent mental distress by level of protective factor, among respondents to 2016 SC BRFSS survey

Protective factor	Poor Health		Frequent Mental Distress	
	Point Estimate	95% CI <sup>2</sup>	Point Estimate	95% CI
Model 1: Exposure to four or more ACES	2.08	2.06–2.09	3.05	3.02–3.07
Model 2: Exposure to four or more ACES and had an adult who made you feel safe and protected <i>some to most of the time</i>	0.61	0.60–0.62	0.69	0.67–0.70
Model 3: Exposure to four or more ACES and had an adult who made you feel safe and protected <i>all of the time</i>	0.60	0.59–0.62	0.83	0.81–0.85
Model 4: Exposure to four or more ACES and had an adult who made sure basic needs were met <i>some to most of the time</i>	0.84	0.82–0.87	0.79	0.77–0.82
Model 5: Exposure to four or more ACES and had an adult who made sure basic needs were met <i>all of the time</i>	0.63	0.61–0.65	0.72	0.70–0.74

<sup>1</sup> Adjusted for sex, age, race/ethnicity, education, and household income. <sup>2</sup> 95% CI = 95% Wald Confidence Limits. ACE, adverse childhood experience; SC, South Carolina; BRFSS, Behavioral Risk Factor Surveillance System

it was asked to be recalled (Horwitz et al. 2001; Roxburgh and MacArthur 2014). However, self-reported health status has been shown to be an accurate predictor of actual health status (Taloyan et al. 2010). We expect that ACEs may be underreported as earlier research has shown that false negatives are common in retrospective reporting; underreporting of ACEs also reflects social desirability (Cronholm et al. 2015; Hardt and Rutter 2004). It is important to note that associations do not imply causations.

## Public Health Applications and Future Research

Understanding that exposure to childhood adversity has long-term effects that may be moderated by protective factors is a crucial step in preventing and responding to ACE exposure. The consequences and long-term impact of ACE exposure can be intergenerational, with the parent's exposure to ACEs adversely affecting their children (Larkin et al. 2012; Larkin and Records 2007). This study reinforces that ACEs and related social or environmental factors should continue to be considered a risk factor for disease and illness, and protective factors may be able to serve as a prevention strategy to reduce the burden of some of the leading causes of death in public health.

The data also emphasize the importance of a two-generation approach in our policies and programs that help families. Programs that teach parenting skills and child development to families, especially to parents/caregivers that may have experienced ACEs themselves, can help develop nurturing and informed parents/caregivers, strengthen families, build stronger social connections both within and outside the family, and potentially reduce the risk of repeating ACEs generationally are needed. Current examples of such programs include federally-funded Maternal, Infant, and Early Childhood Home Visiting (MIECHV) programs and Strengthening Families Programs, both of which implement evidence-based programs designed to strengthen families, improve their well-being, and prevent child maltreatment (Harper Browne 2014; Health Resources and Services Administration 2017). Additionally, state and federal policies that often indirectly support families such as investments in child care, maternity and paternity leave, and safe neighborhoods are vital to the health and well-being of both parents and their children, and can help decrease the risk of exposure to ACEs by providing parents with the socio-economic supports they also need.

Future research which examines SSNRs and other protective factors by specific ACE exposure and stratified by social factors such as gender, socio-economic status, and race/ethnicity will be important to further understand the impact of protective factors. Additionally, research on how protective factors can moderate other important health outcomes such as behavioral risk and chronic disease should be considered given their potential implications for public health efforts.

Finally, the concept of protective factors and the role of SSNRs in preventing and mitigating the impact of ACEs should continue to be explored as a mechanism for “breaking the cycle” of childhood trauma. These efforts can continue to help inform targeted programs designed to moderate the life-long effects of ACEs for some of today's most vulnerable children.

## Compliance with Ethical Standards

All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2000.

**Informed Consent** Informed consent was obtained from all patients for being included in the study.

**Conflict of Interest** N/A.

## References

- Anda, R. F., Felitti, V. J., Bremner, J. D., Walker, J. D., Whitfield, C., Perry, B. D., . . . Giles, W. H. (2006). The enduring effects of abuse and related adverse experiences in childhood. A convergence of evidence from neurobiology and epidemiology. *European Archives of Psychiatry and Clinical Neuroscience*, 256(3), 174–186. <https://doi.org/10.1007/s00406-005-0624-4>.
- Bethell, C., Gombojav, N., Solloway, M., & Wissow, L. (2016). Adverse childhood experiences, resilience and mindfulness-based approach: Common denominator issues for children with emotional, mental, or behavioral problems. *Child and Adolescent Psychiatric Clinics of North America*, 25(2), 139–156.
- Bonnie, R. J., & Monahan, J. (Eds.). (1997). *Mental disorder, work disability, and the law*. Chicago: University of Chicago Press.
- Brown, D. W., Anda, R. F., Tiemeier, H., Felitti, V. J., Edwards, V. J., Croft, J. B., & Giles, W. H. (2009). Adverse childhood experiences and the risk of premature mortality. *American Journal of Preventive Medicine*, 37(5), 389–396. <https://doi.org/10.1016/j.amepre.2009.06.021>.
- Brown, D. W., Anda, R. F., Felitti, V. J., Edwards, V. J., Malarcher, A. M., Croft, J. B., & Giles, W. H. (2010). Adverse childhood experiences are associated with the risk of lung cancer: A prospective cohort study. *BMC Public Health*, 10, 20. <https://doi.org/10.1186/1471-2458-10-20>.
- Center for the Study of Social Policy. (2017). *Strengthening families: The protective factors framework*. Retrieved from <https://www.cssp.org/reform/strengthening-families/basic-one-pagers/Strengthening-Families-Protective-Factors.pdf>.
- Chapman, D. P., Whitfield, C. L., Felitti, V. J., Dube, S. R., Edwards, V. J., & Anda, R. F. (2004). Adverse childhood experiences and the risk of depressive disorders in adulthood. *Journal of Affective Disorders*, 82(2), 217–225. <https://doi.org/10.1016/j.jad.2003.12.013>.
- Chapman, D. P., Liu, Y., Presley-Cantrell, L. R., Edwards, V. J., Wheaton, A. G., Perry, G. S., & Croft, J. B. (2013). Adverse childhood experiences and frequent insufficient sleep in 5 US states, 2009: A retrospective cohort study. *BMC Public Health*, 13(1), 3.
- Child Information Gateway. (2014). *Protective factors: approaches in child welfare (Issue Brief)*. Washington, DC: U.S. Department of Health and Human Services Retrieved from [https://www.childwelfare.gov/pubPDFs/protective\\_factors.pdf](https://www.childwelfare.gov/pubPDFs/protective_factors.pdf).

- Chung, E. K., Nurmohamed, L., Mathew, L., Elo, I. T., Coyne, J. C., & Culhane, J. F. (2010). Risky health behaviors among mothers-to-be: The impact of adverse childhood experiences. *Academic Pediatrics*, 10(4), 245–251. <https://doi.org/10.1016/j.acap.2010.04.003>.
- Cronholm, P. F., Forke, C. M., Wade, R., Bair-Merritt, M. H., Davis, M., Harkins-Schwarz, M., et al. (2015). Adverse childhood experiences: Expanding the concept of adversity. *American Journal of Preventive Medicine*, 49(3), 354–361.
- Crouch, E., Strompolis, M., Bennett, K. J., Morse, M., & Radcliff, E. (2017). Assessing the interrelatedness of multiple types of adverse childhood experiences and odds for poor health in South Carolina adults. *Child Abuse & Neglect*, 65, 204–211. <https://doi.org/10.1016/j.chiabu.2017.02.007>.
- Dong, M., Anda, R. F., Felitti, V. J., Dube, S. R., Williamson, D. F., Thompson, T. J., . . . Giles, W. H. (2004). The interrelatedness of multiple forms of childhood abuse, neglect, and household dysfunction. *Child Abuse & Neglect*, 28(7), 771–784. <https://doi.org/10.1016/j.chiabu.2004.01.008>.
- Dube, S. R., Anda, R. F., Felitti, V. J., Edwards, V. J., & Croft, J. B. (2002). Adverse childhood experiences and personal alcohol abuse as an adult. *Addictive Behaviors*, 27(5), 713–725. [https://doi.org/10.1016/S0306-4603\(01\)00204-0](https://doi.org/10.1016/S0306-4603(01)00204-0).
- Dube, S. R., Felitti, V. J., Dong, M., Chapman, D. P., Giles, W. H., & Anda, R. F. (2003). Childhood abuse, neglect, and household dysfunction and the risk of illicit drug use: The adverse childhood experiences study. *Pediatrics*, 111(3), 564–572.
- Dube, S. R., Miller, J. W., Brown, D. W., Giles, W. H., Felitti, V. J., Dong, M., & Anda, R. F. (2006). Adverse childhood experiences and the association with ever using alcohol and initiating alcohol use during adolescence. *The Journal of Adolescent Health*, 38, 444–461.
- Durlak, J. A. (1998). Common risk and protective factors in successful prevention programs. *The American Journal of Orthopsychiatry*, 68(4), 512–520.
- Edwards, V. J., Holden, G. W., Felitti, V. J., & Anda, R. F. (2003). Relationship between multiple forms of childhood maltreatment and adult mental health in community respondents: Results from the adverse childhood experiences study. *The American Journal of Psychiatry*, 160(8), 1453–1460.
- Felitti, V. J., Anda, R. F., Nordenberg, D., Williamson, D. F., Spitz, A. M., Edwards, V., . . . Marks, J. S. (1998). Relationship of childhood abuse and household dysfunction to many of the leading causes of death in adults: The Adverse Childhood Experiences (ACE) Study. *American Journal Preventive Medicine*, 14(4), 245–258.
- Fergus, S., & Zimmerman, M. A. (2005). Adolescent resilience: A framework for understanding healthy development in the face of risk. *Annual Review of Public Health*, 26, 399–419.
- Ford, E. S., Anda, R. F., Edwards, V. J., Perry, G. S., Zhao, G., Li, C., & Croft, J. B. (2011). Adverse childhood experiences and smoking status in five states. *Preventive Medicine*, 53(3), 188–193. <https://doi.org/10.1016/j.ypmed.2011.06.015>.
- Gilbert, L. K., Breiding, M. J., Merrick, M. T., Thompson, W. W., Ford, D. C., Dhingra, S. S., & Parks, S. E. (2015). Childhood adversity and adult chronic disease: An update from ten states and the District of Columbia, 2010. *American Journal of Preventive Medicine*, 48(3), 345–349. <https://doi.org/10.1016/j.amepre.2014.09.006>.
- Green, J. G., McLaughlin, K. A., Berglund, P. A., Gruber, M. J., Sampson, N. A., Zaslavsky, A. M., & Kessler, R. C. (2010). Childhood adversities and adult psychiatric disorders in the national comorbidity survey replication I: Associations with first onset of DSM-IV disorders. *Archives of General Psychiatry*, 67(2), 113–123. <https://doi.org/10.1001/archgenpsychiatry.2009.186>.
- Greenberg, M. T. (2006). Promoting resilience in children and youth. *Annals of the New York Academy of Sciences*, 1094(1), 139–150. <https://doi.org/10.1196/annals.1376.013>.
- Greene, R. R. (2008). Risk and resilience theory: a Social Work perspective. In R. R. Greene (Ed.), *Human behavior theory and social work practice* (pp. 315–343). New Brunswick: Transaction Publishers.
- Hardt, J., & Rutter, M. (2004). Validity of adult retrospective reports of adverse childhood experiences: Review of the evidence. *Journal of Child Psychology and Psychiatry*, 45(2), 260–273.
- Harper Browne, C. (2014). *The strengthening families approach and protective factors framework*. In *Branching out and reaching deeper*. Washington, DC: Center for the Study of Social Policy.
- Health Resources and Service Administration, Maternal Child Health. (2017). *Home visiting*. Rockville, MD: Health Resources and Services Administration. Retrieved from <https://mchb.hrsa.gov/maternal-child-health-initiatives/home-visiting-overview>.
- Horwitz, A. V., Widom, C. S., McLaughlin, J., & White, H. R. (2001). The impact of childhood abuse and neglect on adult mental health: A prospective study. *Journal of Health and Social Behavior*, 42(2), 184–201.
- Larkin, H., & Records, J. (2007). Adverse childhood experiences: Overview, response strategies, and integral theory. *Journal of Integral Theory and Practice*, 2, 1–25.
- Larkin, H., Shields, J. J., & Anda, R. F. (2012). The health and social consequences of adverse childhood experiences (ACE) across the lifespan: An introduction to prevention and intervention in the community. *Journal of Prevention & Intervention in the Community*, 40, 263–270.
- Larkin, H., Felitti, V. J., & Anda, R. F. (2014). Social work and adverse childhood experiences research: Implications for practice and health policy. *Social Work in Public Health*, 29(1), 1–16.
- McElroy, S., & Hevey, D. (2014). Relationship between adverse early experiences, stressors, psychosocial resources and wellbeing. *Child Abuse & Neglect*, 38(1), 65–75.
- Merrick, M. T., Leeb, R. T., & Lee, R. D. (2013). Examining the role of safe, stable, and nurturing relationships in the intergenerational continuity of child maltreatment—introduction to the special issue. *The Journal of Adolescent Health*, 53(4 Suppl), S1–S3. <https://doi.org/10.1016/j.jadohealth.2013.06.017>.
- Metzler, M., Merrick, M. T., Klevens, J., Ports, K. A., & Ford, D. C. (2017). Adverse childhood experiences and life opportunities: Shifting the narrative. *Child Youth Serv Review*, 72, 141–149. <https://doi.org/10.1016/j.childyouth.2016.10.021>.
- Moore, K. A., & N. Ramirez, A. (2016). Adverse childhood experience and adolescent well-being: Do protective factors matter? *Child Ind Res*, 9, 299, 316.
- Morse, M., Strompolis, M., Priester, M. A., & Wooten, N. R. (2016). *Adverse childhood experiences in South Carolina: A summary of individual demographics and individual ACEs*. Retrieved from: [https://www.researchgate.net/publication/303328647\\_Adverse\\_Childhood\\_Experiences\\_in\\_South\\_Carolina\\_A\\_Summary\\_of\\_Demographics\\_and\\_Individual\\_ACEs](https://www.researchgate.net/publication/303328647_Adverse_Childhood_Experiences_in_South_Carolina_A_Summary_of_Demographics_and_Individual_ACEs).
- Morse, M., Strompolis, M., Priester, M. A., & Srivastav, A. (2017). Adverse childhood experiences in South Carolina: The interrelatedness of adversity. *Research Brief No.*, 9 Retrieved from [https://scchildren.org/public/files/docs/Prevention\\_Learning\\_Center/ACES-in-SC-Research-Brief-Interrelatedness.pdf](https://scchildren.org/public/files/docs/Prevention_Learning_Center/ACES-in-SC-Research-Brief-Interrelatedness.pdf).
- National Survey of Children's Health: NSCH 2011/12. (n.d.). Data query from the Child and Adolescent Health Measurement Initiative, Data Resource Center for Child and Adolescent Health website. Retrieved from [www.childhealthdata.org](http://www.childhealthdata.org).
- Rich-Edwards, J. W., Mason, S., Rexrode, K., Spiegelman, D., Hibert, E., Kawachi, I., . . . Wright, R. J. (2012). Physical and sexual abuse in childhood as predictors of early-onset cardiovascular events in women. *Circulation*, 126(8), 920–927. <https://doi.org/10.1161/circulationaha.111.076877>.
- Roxburgh, S., & MacArthur, K. R. (2014). Childhood adversity and adult depression among the incarcerated: Differential exposure and



- vulnerability by race/ethnicity and gender. *Child Abuse & Neglect*, 38(8), 1409–1420. <https://doi.org/10.1016/j.chiabu.2014.02.007>.
- Roy, A., Janal, M. N., & Roy, M. (2010). Childhood trauma and prevalence of cardiovascular disease in patients with type 1 diabetes. *Psychosomatic Medicine*, 72(8), 833–838. <https://doi.org/10.1097/PSY.0b013e3181eaf2d>.
- Schofield, T. J., Lee, R. D., & Merrick, M. T. (2013). Safe, stable, nurturing relationships as a moderator of intergenerational continuity of child maltreatment: A meta-analysis. *The Journal of Adolescent Health*, 53(4), S32–S38.
- Shonkoff, J. P., & Gamer, A. S. (2012). The lifelong effects of early childhood adversity and toxic stress. *Pediatrics*, 129(1), e232–e246. <https://doi.org/10.1542/peds.2011-2663>.
- Shonkoff, J. P., Boyce, W. T., & McEwen, B. S. (2009). Neuroscience, molecular biology, and the childhood roots of health disparities: Building a new framework for health promotion and disease prevention. *JAMA*, 301(21), 2252–2259.
- Srivastav, A., Fairbrother, G., & Simpson, L. A. (2017). Addressing adverse childhood experiences through the affordable care act: Promising advances and missed opportunities. *Academic Pediatrics*, 17(7S), S136–S143. <https://doi.org/10.1016/j.acap.2017.04.007>.
- Taloyan, M., Wajngot, A., Johansson, S. E., Tovi, J., & Sundquist, J. (2010). Poor self-rated health in adult patients with type 2 diabetes in the town of Sodertälje: A cross-sectional study. *Scandinavian Journal of Primary Health Care*, 28(4), 216–220. <https://doi.org/10.3109/00016349.2010.501223>.
- Thomberry, T. P., Henry, K. L., Smith, C. A., Ireland, T. O., Greenman, S. J., & Lee, R. D. (2013). Breaking the cycle of maltreatment: The role of safe, stable, and nurturing relationships. *The Journal of Adolescent Health*, 53(4), S25–S31.
- US Centers for Disease Control and Prevention. (1998). Self-reported frequent mental distress among adults—United States, 1993–1996. *MMWR Morbidity and Mortality Weekly Report*, 47(16), 326.
- US Centers for Disease Control and Prevention. (2014a). *Behavior Risk Factor Surveillance System*. Retrieved from <http://www.cdc.gov/brfss/>.
- US Centers for Disease Control and Prevention (2014b). Safe, stable, and nurturing relationships may shield children against poor health later in life. Retrieved from. [https://www.cdc.gov/violenceprevention/pub/healthy\\_infants.html](https://www.cdc.gov/violenceprevention/pub/healthy_infants.html).
- Waite, R., Davey, M., & Lynch, L. (2013). Self-rated health and association with ACEs. *Journal of Behavioral Health*, 2(3), 198–205.
- Walker, S. P., Wachs, T. D., Grantham-McGregor, S., Black, M. M., Nelson, C. A., Huffman, S. L., et al. (2011). Inequality in early childhood: Risk and protective factors for early child development. *The Lancet*, 378(9799), 1325–1338.
- Zimmerman, M. A. (2014). Resiliency theory: A strengths-based approach to research and practice for adolescent health. *Health Education & Behavior*, 40(4), 381–383.